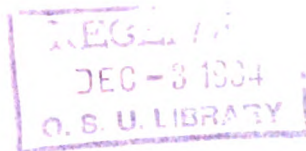


DEPARTMENT OF THE INTERIOR

UNITED STATES BUREAU OF MINES

JOHN W. FINCH, DIRECTOR



INFORMATION CIRCULAR

SAFETY IN MINING IN 1933



BY

D. HARRINGTON

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Although it is impossible to give definite final figures at this time on Nation-wide accident occurrence in 1933, enough data are at hand to indicate that the progress in safety in the mining industry, which first became apparent in 1930 and was accentuated in 1931 and 1932, was continued and much improved in 1933. This improvement was of considerable magnitude in mining both bituminous coal and anthracite but was not so great in other branches of the mining industry. While the volume of work done in all phases of mining increased in 1933 over that in 1932, the exact amount of the increase is not yet known. Usually increased activity in mining is accompanied by even greater increase in the rate of occurrence of accidents to the workers, but happily it appears that this "rule" was not operating in 1933--at least in the coal-mining industry.

COAL MINING

Preliminary data compiled through figures furnished the Bureau of Mines by the various State mine inspectors, as well as by the operators, indicate that 1,013 persons were killed in the production of about 377,339,000 tons of coal in 1933, by far the fewest number killed in coal mining in the United States in any year of the present century; the previous low was in 1932 with 1,207 fatalities. In addition, the tentative fatality rate of 2.68 per million tons of coal produced is by far the lowest on record, the previous low being 3.31 in 1931.

The year 1933 was remarkable also in the fact that both anthracite and bituminous mining acted in unison to bring about the new all-time low fatality rates. The 1933 bituminous tentative fatality rate of 2.39 killed per million tons produced is the lowest in the history of the industry (782 persons being killed), and the anthracite tentative rate of 4.68 has a similar distinction (231 being killed).

1/ The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from U.S. Bureau of Mines Information Circular 6811."

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States which definitely improved occurrence of fatal accidents in 1933 over 1932 are: Colorado with 18 instead of 23; Illinois, 71 instead of 119; Indiana, 24 instead of 31; Iowa, 6 instead of 18; Michigan, 1 instead of 3; New Mexico, 4 instead of 20; Oklahoma, 7 instead of 11; Pennsylvania (anthracite), 231 instead of 249; Pennsylvania (bituminous), 141 instead of 162; Virginia, 18 instead of 74; and West Virginia, 248 instead of 267. States with poorer coal-mine-fatality records in 1933 than in 1932 are: Missouri, with 9 fatal accidents in 1933 against 7 in 1932; North Dakota, 5 against 2; Ohio, 52 against 36; Tennessee, 14 against 9; and Wyoming, 9 against 6. The coal mines operated in Idaho and Texas did not have a fatality in 1933. All of these 1933 figures are preliminary or tentative, but the 1932 data are final as given by the Demographical Division of the United States Bureau of Mines.

Falls of roof and coal caused 571 fatalities, or about 56 percent of the 1,013 coal-mine fatalities for the year 1933, against 619 out of 1,207 fatalities in 1932, or about 51 percent. Notwithstanding the higher percentage in 1933, the fatality rate from falls of roof and coal per million tons of coal produced in 1933 was only 1.513 as against 1.732 in 1932. The higher percentage of fatalities from roof falls in 1933 was due chiefly to the fact that very few deaths occurred from explosions of gas or dust last year, automatically increasing the percentages of the other main causes of fatal accidents in the coal mines, even though the rate of accident occurrence for those causes was lowered in some instances.

Haulage caused 188 fatalities in 1933, or over 18 percent of the total for the year, against 180 in 1932, or approximately 15 percent of that year's total. The rate of occurrence of haulage fatalities per million tons of coal produced in 1933 was 0.498, very little change from the rate of 0.500 in 1932.

In fatalities from gas and dust explosions 1933 established new low records; there were only 39 fatalities from this source, or 3.8 percent of the fatalities for the year instead of the average of about 14 percent for the past 10 years; in the previous year there were 169 fatalities from this cause, the percentage of the total being about 14. The fatality rate from explosions of gas or dust per million tons of coal produced in 1933 was only 0.103, while in 1932 it was 0.470. The vast improvement in our coal mines with respect to occurrence of explosions and fatalities from them may be seen from the following data. In the 5 years 1906-10, inclusive (or those immediately preceding the functioning of the Bureau of Mines as an agency looking to the advancement of safety in mining), there were 84 major coal-mine explosion disasters in the United States (a major disaster being one causing loss of 5 or more lives), or at the rate of almost 17 major coal-mine disasters per year; in 1933 only 1 major disaster occurred in the coal mines of the United States and that one cost 7 lives. Fatalities from explosions of gas or dust caused 2,388 fatalities in the coal mines of the United States in the 5-year period 1906-10, inclusive, or about 478 annually, while in 1933 only 39 persons were killed in both major and minor coal-mine explosions in the United States. If the fatality rate from coal-mine explosions of 1.059 persons killed per million tons produced in the 5-year period 1906-10, inclusive, had continued to the first of January 1934,

there would have been 13,340 fatalities from explosions of gas or dust in our coal mines instead of the 6,378 which available statistics show actually occurred; if the 1.059 rate had been in effect in 1933 there would have been nearly 400 persons killed in our coal mines due to explosions instead of the 39 given in the tentative figures now at hand.

Explosives caused only 28 fatalities in our coal mines in 1933, or about 2.7 percent of all fatalities, as against 36 in 1932, or about 3.0 percent. The fatality rate from the use of explosives per million tons of coal produced in our coal mines in 1933 was 0.074, or somewhat lower than the rate of 0.100 of the previous year. These figures, however, do not include fatalities in explosions of gas or dust initiated by or through explosives.

Fifty-five persons were killed in or around our coal mines in 1933 from electricity, the percentage of the total fatalities being about 5.4; in the previous year 47 were killed from this cause, the percentage being about 4.0. The fatality rate from electricity per million tons produced in 1933 was 0.146, while in 1932 it was 0.1310. In neither 1932 nor 1933 does the number of accidents from electricity or the fatality rate include fatalities from explosions of gas or dust caused by electricity; however, both 1932 and 1933 were remarkable in the relatively few fatalities in coal mines caused by explosions of electrical origin, contrasting nicely in this respect with the years 1927 to 1931, inclusive, every one of which had a black record in fatalities from explosions of electrical origin.

In 1933 only 16 persons are known to have been killed in or around mines by machinery, or about 1 1/2 percent of the total, compared with 28 killed from the same cause in 1932, or about 2.3 percent of the total. The fatality rate per million tons from machinery accidents in 1933 was 0.043 and in 1932 was 0.078. These figures do not include fatalities from machinery in which haulage accidents were involved or fatalities from machinery in which electricity initiated explosions of gas or dust.

Surface and miscellaneous accidents caused 116 fatalities in 1933, or about 11.4 percent of the total for the year; 128 were due to the same cause in 1932, the percentage of total being about 10.6.

The 1,013 fatalities (tentative total) in the coal mines of the United States in 1933 constitute the smallest number of persons killed in any year during the present century in the coal mines of this country, and the tentative rate of 2.68 fatalities per million tons of coal produced is by far the lowest (or best) fatality rate in the recorded history of coal mining in the United States. The fatality rate per million tons of coal produced for the 5-year period 1906-10, inclusive, was 5.89, for the 5-year period 1911-15 it was 4.76, for 1916-20 it was 3.86, for 1921-25 it was 3.96, and for 1926-30 it was 3.75. The rate was 3.31 for 1931 and 3.36 for 1932; the foregoing indicates that the 2.68 (tentative) rate for 1933 is by far the best rate in the past 27 years. During the 5-year period 1906-10 (preceding the functioning of the Bureau of Mines), 13,288 persons were killed in the coal mines of the United States, an average of 2,658 per year or more than 2 1/2 times the 1,013 killed in 1933. If the fatality rate of 5.89 per million tons of coal produced which

applied to the 5-year period 1906-10 had continued to effect to January 1, 1934 the number of fatalities for the period 1911 to 1933, inclusive, would have been 24,300 greater than the number which actually occurred. Hence, because of numerous factors, one of the most effective of which is the safety work of the United States Bureau of Mines, more than 1,000 lives of workers in and around the coal mines of the United States have been saved annually since the Bureau of Mines has been in existence. If the coal-mining fatality rate of 5.89 for the period 1906-10 had been in effect in 1933, instead of approximately 1,013 deaths the number would have been about 2,225, which indicates rather vividly the fact that present-day coal-mine safety is much farther advanced than in the "good old days" of 1906-10.

All of the foregoing data as to occurrence of fatalities in the coal mines of the United States in 1933 are based on tentative or preliminary figures which probably will be slightly revised upon receipt of additional, belated information from some States. Final figures on 1933 probably will not be available until late in the fall of 1934.

All the foregoing data have been based upon fatalities and on coal tonnage because information on these items of coal-mining operations are fairly quickly available in tentative form after the expiration of the calendar year. Final figures, not only as to coal-mine fatalities and tonnage but also as to non-fatal accidents, man-hours of exposure, etc., for 1932 were released in January 1934 and are of interest in connection with the tentative figures for 1933 given in this report. Table 1, compiled by W. W. Adams and L. E. Geyer of the Demographical Division of the Bureau of Mines, gives data as to number of mines, tonnage, number employed, and average days of exposure per man in the coal mines of the various States in 1932.

Table 1 shows that the 309,709,372 tons of bituminous coal produced in 1932 came from 5,473 mines, Pennsylvania (bituminous) having the greatest number (1,119), West Virginia second with 740, and Illinois third with 588, while Michigan had only 5 and Alaska only 7.

In number of persons employed Pennsylvania (anthracite) ranked first in 1932 with 121,243, Pennsylvania (bituminous) second with 104,532, and West Virginia third with 85,765; Alaska had 120, Texas 699, and Michigan 940.

West Virginia ranked first in 1932 in coal production with 85,608,735 tons, Pennsylvania (bituminous) second with 74,775,862 tons, Pennsylvania (anthracite) third with 49,855,221 tons, and Kentucky fourth with 35,299,582 tons.

Table 2 gives data by States for coal mines in the United States in 1932 as to man-hours of exposure; this table also was compiled by W. W. Adams and L. E. Geyer of the Demographical Division of the Bureau.

TABLE 1. - Accidents and man-hours worked at coal mines of the United States during the calendar year 1932

State	Number of mines	Tons produced	Men employed				Average days of exposure per man
			Under-ground	Open-cut	Surface	Total	
Alabama	194	7,856,939	17,734	112	2,597	20,443	107
Alaska	7	102,700	70	- -	50	120	189
Arkansas	65	1,033,471	3,776	50	539	4,325	92
Colorado	231	5,598,721	7,348	14	1,387	8,749	142
Illinois	588	33,474,553	39,928	1,693	5,906	47,597	112
Indiana	162	13,323,573	7,629	1,592	1,412	10,639	145
Iowa	212	3,862,435	7,180	107	799	8,086	151
Kansas	147	1,952,885	2,630	625	336	3,591	130
Kentucky	439	35,299,382	35,760	30	6,477	42,267	155
Maryland	80	1,428,937	2,748	- -	357	3,105	150
Michigan	5	446,149	852	- -	88	940	159
Missouri	205	4,069,598	4,111	890	676	5,677	161
Montana	62	2,125,225	1,139	47	339	1,525	145
New Mexico	42	1,263,386	2,225	- -	377	2,602	127
North Dakota	147	1,739,658	696	304	311	1,311	186
Ohio	562	13,909,451	20,254	300	2,726	23,280	127
Oklahoma	93	1,255,466	2,389	217	457	3,063	120
Pennsylvania bitu- minous	1,119	74,775,662	92,927	97	11,508	104,532	153
Tennessee	75	3,537,882	6,445	- -	1,080	7,525	148
Texas	19	636,590	565	27	107	699	152
Utah	39	2,852,127	2,155	- -	687	2,842	176
Virginia	76	7,692,180	8,760	- -	1,616	10,376	144
Washington	63	1,591,426	2,284	4	528	2,816	160
West Virginia	740	25,608,735	72,679	- -	13,086	25,765	167
Wyoming	65	4,170,963	3,370	10	793	4,173	150
Other States ^{1/}	36	101,578	190	49	93	332	118
Total bituminous	5,473	309,709,872	345,874	6,168	54,338	405,380	146
Pennsylvania anthra- cite	- -	49,655,221	94,210	2,312	24,721	121,243	161
Grand total: 1932 ...	- -	359,565,093	440,084	8,480	79,059	527,623	149
1931 ...	- -	441,750,978	496,973	8,491	84,241	589,705	168

NOTE: Slight differences, if any, between accident figures published by the U.S. Bureau of Mines and those published by the mine officials of some States are due to differences in defining a mine accident or to variations in classes of mines canvassed.

^{1/} Includes Arizona, California, Georgia, Idaho, North Carolina, Oregon, and South Dakota.

TABLE 2. - Accidents and man-hours worked at coal mines of the United States during the calendar year 1932

State	Man-hours of exposure			
	Under-ground	Opencut	Surface	Total
Alabama	17,095,760	98,340	2,793,156	19,987,256
Alaska	110,112	- - -	71,248	181,360
Arkansas	2,758,552	37,500	381,056	3,177,108
Colorado	8,484,912	14,488	1,861,168	10,360,568
Illinois	34,327,698	2,507,317	5,616,775	42,451,790
Indiana	7,987,519	2,607,532	1,733,957	12,329,008
Iowa	8,701,383	113,860	975,431	9,790,674
Kansas	2,607,845	597,694	436,755	3,642,294
Kentucky	44,886,097	1,200	8,378,011	53,265,308
Maryland	3,275,776	- - -	450,992	3,726,768
Michigan	1,094,344	- - -	102,888	1,197,432
Missouri	5,231,804	1,275,645	872,632	7,380,081
Montana	1,235,511	73,068	439,420	1,778,099
New Mexico	2,238,305	- - -	431,748	2,670,053
North Dakota	1,059,334	566,598	466,314	2,092,246
Ohio	20,355,201	437,467	2,928,658	23,769,326
Oklahoma	2,280,736	257,916	433,072	2,971,724
Pennsylvania bituminous	113,849,458	114,430	14,420,424	128,384,312
Tennessee	7,907,099	- - -	1,330,149	9,237,248
Texas	794,491	19,512	122,502	936,305
Utah	2,867,254	- - -	1,139,231	4,006,535
Virginia	10,163,630	- - -	1,853,618	12,017,248
Washington	2,857,017	3,264	748,740	3,609,021
West Virginia	97,928,404	- - -	17,210,246	115,138,650
Wyoming	3,862,654	24,960	1,132,851	5,020,465
Other States ^{1/}	192,496	51,968	81,988	326,452
Total bituminous .	404,181,692	8,852,759	66,412,880	479,447,331
Pennsylvania anthracite	119,217,854	2,663,201	34,062,944	156,943,999
Grand total: 1932	523,399,546	12,515,960	100,475,824	636,391,330
1931	670,051,882	12,937,803	121,404,445	804,394,130

NOTE: Slight differences, if any, between accident figures published by the U.S. Bureau of Mines and those published by the mine officials of some States are due to differences in defining a mine accident or to variations in classes of mines canvassed.

^{1/} Includes Arizona, California, Georgia, Idaho, North Carolina, Oregon, and South Dakota.

Table 2, taken in conjunction with table 1, shows that proportionately anthracite mines have a much greater exposure than have bituminous mines, as the anthracite mines of Pennsylvania produced only 49,855,221 tons of coal in 1932, or less than 14 percent of the Nation's coal tonnage, but had 156,943,999 man-hours of exposure, or nearly 25 percent of the total exposure of 636,391,330 man-hours. Pennsylvania (anthracite) with 119,217,854 man-hours held first place in man-hours of exposure in 1932, Pennsylvania (bituminous) being second with 113,849,458 man-hours, West Virginia third with 97,928,404, and Kentucky fourth with 44,886,097. Table 2 also shows that over 82 percent of the man-hours of exposure in and around coal mines of the United States in 1932 was in connection with underground workers, nearly 16 percent was due to surface workers, and about 2 percent was due to those employed in opencut operations. It also indicates that, compared with 1931, man-hours of exposure for 1932 remained about stationary for opencut operations, while there was about a 17-percent decrease for surface workers and nearly a 22-percent decrease for underground employees. The total decrease in man-hours of exposure in the coal mines of the United States in 1932 as compared with 1931 was nearly 21 percent.

Table 3 gives data by States on the number of the various kinds of fatal and nonfatal accidents which occurred in the coal mines of the United States in 1932 as well as on the rates of both fatal and nonfatal accidents per million man-hours of exposure. This table was also compiled by W. W. Adams and L. E. Geyer.

In table 3 it appears the Pennsylvania (anthracite) mines held the unenviable position of first place in the number of injuries of all kinds (fatal and nonfatal) in coal mining in 1932 with 19,620, Pennsylvania (bituminous) being second with 9,584, West Virginia third with 9,456, and Illinois fourth with 5,332. West Virginia holds an unenviable position also in that it led in injuries causing permanent total disability with 27, Pennsylvania (anthracite) being second with 14, and Kentucky and Pennsylvania (bituminous) being tied for third place with 11 each. Inasmuch as permanent total disability accidents must be classed as even worse than fatalities, in at least some respects, it is noteworthy that in 1932 the following States, insofar as available information indicates, had no permanent total disability injuries: Alaska, Illinois, Iowa, Maryland, Missouri, Montana, New Mexico, North Dakota, Ohio, Oklahoma, Texas, Utah, and Washington.

In the rate of fatal accidents per million man-hours in the coal mines of the United States in 1932, New Mexico with 7.490 ranks the highest or poorest, Virginia being second with 6.153, and Oklahoma third with 3.702; the average for the coal mines of the United States was 1.897 in 1932, or slightly higher than the rate of 1.819 for 1931.

TABLE 3. - Accidents and man-hours worked at coal mines of the United States during the calendar year 1932

State	Killed	Injured				Rate per million man-hours		
		Perma- nent total disa- bility	Perma- nent partial disa- bility	Tempo- rary	Total	Killed	Injured	Fatal and non- fatal
Alabama	21	1	53	904	958	1.051	47.931	48.982
Alaska	-	-	-	14	14	-	77.195	77.195
Arkansas	4	1	4	145	150	1.259	47.213	48.472
Colorado	28	1	24	1,103	1,128	2.703	108.874	111.577
Illinois	119	-	208	5,124	5,332	2.803	125.601	128.404
Indiana	31	7	37	1,838	1,882	2.514	152.648	155.162
Iowa	18	-	9	920	929	1.838	94.886	96.724
Kansas	11	1	3	286	290	3.020	79.620	82.640
Kentucky	102	11	227	3,346	3,584	1.915	67.286	69.201
Maryland	3	-	10	212	222	.805	59.569	60.374
Michigan	3	1	-	99	100	2.505	83.512	86.017
Missouri	7	-	6	565	571	.948	77.370	78.318
Montana	3	-	3	134	137	1.687	77.049	78.736
New Mexico	20	-	2	164	166	7.490	62.171	69.661
North Dakota	2	-	-	155	155	.956	74.083	75.039
Ohio	36	-	36	1,835	1,871	1.515	78.715	80.230
Oklahoma	11	-	4	305	309	3.702	103.980	107.682
Pennsylvania bitu- minous	162	11	141	9,432	9,584	1.262	74.651	75.913
Tennessee	9	1	22	372	395	.974	42.762	43.736
Texas	1	-	-	184	184	1.068	196.517	197.585
Utah	10	-	6	450	456	2.496	113.814	116.310
Virginia	74	2	58	778	838	6.158	69.733	75.891
Washington	9	-	14	330	344	2.494	95.317	97.811
West Virginia	267	27	461	8,968	9,456	2.319	82.127	84.446
Wyoming	6	1	22	258	281	1.195	55.971	57.166
Other States ^{1/}	11	-	-	16	16	3.063	49.012	52.075
Total bituminous	958	65	1,350	37,937	39,352	1.998	82.078	84.076
Pennsylvania anthra- cite	249	14	98	19,508	19,620	1.587	125.013	126.600
Grand total: 1932 ...	1,207	79	1,448	57,445	58,972	1.897	92.666	94.563
1931 ...	1,463	98	1,773	78,478	80,349	1.819	99.888	101.707

NOTE: Slight differences, if any, between accident figures published by the U.S. Bureau of Mines and those published by the mine officials of some States are due to differences in defining a mine accident or to variations in classes of mines canvassed.

^{1/} Includes Arizona, California, Georgia, Idaho, North Carolina, Oregon, and South Dakota.

In the rate of nonfatal accidents per million man-hours in the coal mines of the United States in 1932, Texas with 196.517 ranks first (or poorest), Indiana being second with 152.648, Illinois third with 125.601, and Pennsylvania (anthracite) a close fourth with 125.013. The rate for the United States as a whole in 1932 was 92.666 or somewhat better than the 99.888 of 1931. It is significant that only 9 of the 26 States and territories listed in table 3 as having produced coal in 1932 had a higher rate of nonfatal accidents per million man-hours than the average for the country as a whole (92.666). The States with a rate higher than that of the country as a whole were Texas (196.517), Indiana (152.648), Illinois (125.601), Pennsylvania anthracite (125.013), Utah (113.814), Colorado (108.874), Oklahoma (103.980), Washington (95.317), and Iowa (94.836).

The coal mines of the United States had 1,207 fatal accidents in 1932 and 58,972 nonfatal accidents, or practically 49 nonfatal accidents to each fatality; the ratio in 1931 was about 55 nonfatal to each fatal accident. In bituminous mines in 1932 the ratio was about 43 nonfatal to each fatal accident, and in anthracite mining the ratio was about 79 nonfatal accidents to each fatality.

Table 4 (also compiled by W. W. Adams and L. E. Geyer of the Demographical Division of the Bureau of Mines) gives data by States on the rate of both fatal and nonfatal accidents per million tons of coal produced in the coal mines of the United States in 1932.

In the following table New Mexico ranks first as having the highest or worst fatality rate per million tons of coal produced in 1932 with 15.830, Virginia is second with 9.620, and Oklahoma is third with 8.762; the anthracite rate is 4.994, and the rate for all coal mining in the United States is 3.357 or slightly higher than the rate of 3.312 in 1931, which is the lowest rate in the history of coal mining in the United States except for the rate in 1933 (preliminary) of 2.68.

The highest or worst rate for nonfatal injuries per million tons of coal produced in 1932 went to Pennsylvania (anthracite), the rate being 393.540; Texas was second with 289.040 and Oklahoma third with 246.124; the average for the United States as a whole was 164.009, or considerably lower (better) than the 1931 rate of 181.888.

In 1932 Pennsylvania anthracite had the highest rate of combined fatal and nonfatal accidents per million tons of coal produced, its rate being 398.534, Texas was second with 290.611, Oklahoma third with 254.836, and Iowa fourth with 245.182. The average for the coal mines of the United States was 167.366, a materially lower rate than the 185.200 of 1931. Only 7 of the 26 States listed in table 4 as having produced coal in 1932 had combined fatal and nonfatal accident rates per million tons of coal higher than the average for the country of 167.366; the 7 States were Pennsylvania (anthracite), Texas, Oklahoma, Iowa, Michigan, Washington, and Colorado; it is noticeable that the rate for all of the bituminous mines of the United States was 130.158, or less than one third the Pennsylvania anthracite rate of 398.534.

TABLE 4. - Accidents and man-hours worked at coal mines of the United States during the calendar year 1932

State	Rate per million tons			Tons per man-hour	Man-hours per ton	Average hours per day	Average hours per man per year
	Killed	Injured	Fatal and nonfatal				
Alabama	2.673	121.930	124.603	0.303	2.544	9.17	972
Alaska	-	136.319	136.319	.566	1.766	8.00	1,511
Arkansas	3.870	145.142	149.012	.325	3.074	8.02	735
Colorado	5.001	201.475	206.476	.540	1.851	8.34	1,184
Illinois	3.555	159.285	162.840	.789	1.268	7.99	802
Indiana	2.327	141.253	143.580	1.081	.925	8.00	1,159
Iowa	4.660	240.522	245.182	.395	2.535	8.02	1,211
Kansas	5.633	148.498	154.131	.536	1.365	7.82	1,014
Kentucky	2.890	101.531	104.421	.663	1.509	8.16	1,260
Maryland	2.099	155.360	157.459	.323	2.608	8.00	1,200
Michigan	6.724	324.140	230.864	.373	2.684	8.00	1,274
Missouri	1.720	140.309	142.029	.551	1.813	8.07	1,300
Montana	1.412	64.464	65.876	1.195	.837	8.07	1,166
New Mexico	15.830	131.393	147.223	.473	2.113	8.07	1,026
North Dakota	1.150	89.098	90.248	.831	1.203	8.56	1,596
Ohio	2.588	134.513	137.101	.585	1.709	8.01	1,021
Oklahoma	8.732	246.124	254.886	.422	2.367	8.06	970
Pennsylvania bituminous	2.166	128.170	130.336	.582	1.717	8.01	1,228
Tennessee	2.544	111.649	114.193	.383	2.611	8.29	1,228
Texas	1.571	289.040	290.611	.680	1.471	8.82	1,339
Utah	3.506	159.881	163.387	.712	1.405	8.00	1,410
Virginia	9.620	108.942	118.562	.640	1.562	8.06	1,158
Washington	5.655	216.158	221.813	.441	2.268	8.00	1,282
West Virginia	3.119	110.456	113.575	.744	1.345	8.03	1,342
Wyoming	1.439	67.371	68.810	.831	1.204	8.00	1,203
Other States ^{1/}	9.864	157.825	167.639	.311	3.220	8.32	983
Total bituminous	3.093	127.065	130.153	.646	1.548	8.09	1,180
Pennsylvania anthracite	4.994	393.540	398.534	.318	3.148	8.05	1,294
Grand total: 1932 ...	3.357	164.009	167.366	.565	1.770	8.08	1,306
1931 ...	3.312	181.888	185.200	.549	1.821	8.10	1,364

NOTE: Slight differences, if any, between accident figures published by the U.S. Bureau of Mines and those published by the mine officials of some States are due to differences in defining a mine accident or to variations in classes of mines canvassed.

^{1/} Includes Arizona, California, Georgia, Idaho, North Carolina, Oregon, and South Dakota.

Montana, with a combined fatal and nonfatal accident rate of only 65.876 per million tons of coal produced, had the distinction of having the lowest rate of all coal mining States in 1932; Wyoming was second with 68.810 and North Dakota third with 90.248, all of the other States having rates in excess of 100.000.

METAL AND NONMETALLIC MINERAL MINING

Nation-wide data on accidents in metal mining for 1933 will not be available until late in the fall of 1934, nor are tentative or preliminary figures on a Nation-wide basis yet at hand. However, data on 190 identical mines for the years 1932 and 1933 are here given and compared. These 190 mines produced 18,652,354 tons of ore in 1933, or slightly more than the 18,135,012 tons in 1932, although only 19,536 men were employed in 1933 as against 20,544 in 1932. The number of shifts worked in 1933 was 4,483,300, and the number in 1932 was 4,488,305; the number of man-hours of exposure was 36,285,332 in 1933 and 36,917,234 in 1932. Thirty-nine persons were killed in 1933 and 33 in 1932; 2,220 were injured (nonfatally) in 1933 and 2,260 in 1932. The number killed per million man-hours in these 190 mines was 1.08 in 1933 and 0.89 in 1932, indicating a trend for the worse in 1933; the number injured nonfatally per million man-hours of exposure in 1933 was 61.18 and in 1932 was 61.22, practically identical performances from a safety point of view for the 2 years as regards nonfatal injuries. The above figures, compiled by the Demographical Division of the United States Bureau of Mines, appear to indicate that metal mining, which was by no means active in the early part of 1933 and not very active even in the later months of the year, probably receded at least slightly rather than advanced in its safety performances.

Definite data on occurrence of accidents in metal and nonmetallic mineral mining in 1932, released by the Bureau of Mines in November 1933, are the latest available on a Nation-wide basis on accidents in those industries, and table 5 compiled by W. W. Adams, L. E. Geyer, and M. E. Kolhos, Demographical Division, Bureau of Mines, gives by States much of the salient information on accident occurrence in those industries.

One of the principal features brought out in table 5 is the relatively few persons engaged in the metal and nonmetallic mineral mines (other than coal) in the United States in 1932, there being only 53,288 employed in those industries according to the data in this table; this number appears particularly small when it is considered that in the same year the anthracite mines of Pennsylvania employed 121,243 persons, the bituminous mines of Pennsylvania 104,532, and the coal mines of West Virginia 85,765, while all of the coal mines of the United States employed 527,623 persons in 1932, or nearly 10 times the number engaged in metal and nonmetallic mineral mining (other than coal).

TABLE 5. - Accident rates and man-hours of exposure in the metal-mining industry ^{1/}
in the United States in 1932

State	Men em- ployed	Man-hours worked	Average shifts per man	Average hours per man	Killed	In- jured	Rate per million man-hours		
							Killed	In- jured	Fatal and nonfatal
Alabama	2,288	2,968,053	106	1,028	2	71	0.57	23.92	24.59
Alaska	3,149	5,993,752	238	1,903	5	214	.83	35.70	36.53
Arizona	3,750	6,161,834	206	1,648	9	300	1.46	48.53	49.99
California ...	5,646	10,051,955	222	1,780	25	929	2.49	92.42	94.91
Colorado	1,891	3,822,568	253	2,021	11	420	2.83	109.87	112.75
Florida	758	1,561,634	216	2,060	1	48	.64	30.74	31.38
Georgia	282	686,872	244	2,436	-	17	-	24.75	24.75
Idaho	3,232	4,989,429	193	1,544	9	403	1.80	80.77	82.57
Illinois	118	80,668	83	684	-	6	-	74.38	74.38
Iowa	123	100,535	103	817	-	8	-	79.57	79.57
Kansas	764	1,088,418	165	1,425	4	66	3.68	60.64	64.32
Kentucky	359	389,489	113	1,085	-	21	-	53.92	53.92
Michigan	7,368	11,707,925	188	1,589	5	327	.43	27.93	28.36
Minnesota	3,511	6,258,736	194	1,783	2	88	.32	14.06	14.38
Missouri	2,095	2,660,957	159	1,270	3	131	1.13	49.23	50.36
Montana	2,200	4,577,740	260	2,081	8	275	1.75	60.07	61.82
Nevada	1,345	2,263,787	210	1,683	2	122	.88	53.89	54.77
New Jersey ...	635	1,249,910	246	1,968	1	54	.80	43.21	44.01
New Mexico ...	1,442	2,813,678	247	1,953	1	153	.36	54.32	54.68
New York	960	1,441,636	188	1,502	2	40	1.39	27.75	29.14
North Carolina	176	381,337	231	2,167	-	16	-	41.96	41.96
Oklahoma	956	1,311,112	170	1,371	2	167	1.53	127.37	128.90
Oregon	334	388,396	142	1,163	-	17	-	43.77	43.77
Pennsylvania..	332	227,445	73	685	-	-	-	-	-
South Dakota .	1,473	3,829,054	325	2,599	-	183	-	47.79	47.79
Tennessee	1,096	1,944,506	202	1,774	2	53	1.03	27.26	28.29
Texas	1,237	3,341,025	331	2,701	2	114	.60	34.12	34.72
Utah	2,711	6,147,450	283	2,268	9	383	1.46	94.84	96.30
Virginia	815	1,166,011	147	1,431	1	51	.86	43.74	44.60
Washington ...	286	306,076	134	1,070	1	16	3.27	52.27	55.54
Wisconsin	569	1,046,794	212	1,840	-	56	-	53.50	53.50
Wyoming	41	27,383	84	668	-	-	-	-	-
Other States ^{2/}	746	1,029,261	153	1,380	-	65	-	63.15	63.15
Total: 1932	53,288	92,038,326	208	1,727	107	5,014	1.16	54.48	55.64
1931	80,940	156,177,859	231	1,930	158	8,709	1.01	55.76	56.77

NOTE: Slight differences, if any, between accident figures published by the U.S. Bureau of Mines and those published by the mine officials of some States are due to differences in defining a mine accident or to variations in classes of mines canvassed.

^{1/} The figures also cover the mining of nonmetallic minerals other than coal but do not include the milling and smelting of ores. A separate report is published by the Bureau of Mines for mills and smelters.

^{2/} Includes Arkansas, Connecticut, Louisiana, Maine, Maryland, Massachusetts, New Hampshire, Ohio, South Carolina, and Vermont.

On the basis of number killed per million man-hours of exposure, the 1932 rate of 1.16 for metal and nonmetallic mineral mines is considerably higher than the rate of 1.01 in 1931 when 80,940 were employed. In 1932 Kansas had the highest or poorest fatality rate per million man-hours in its metal mines (3.68), Washington second (3.27), Colorado third (2.88), and California fourth (2.49). The following States, most of them with relatively light employment and man-hours of exposure, escaped in 1932 without fatalities in their metal or nonmetallic mineral mines: Georgia, Illinois, Iowa, Kentucky, North Carolina, Oregon, Pennsylvania, South Dakota, Wisconsin, and Wyoming; of these, South Dakota with 3,829,054 man-hours of exposure and Wisconsin with 1,046,794 man-hours, both without a fatality in 1932, indicated excellent safety performance, the South Dakota record being especially impressive with 1,473 employed and working 325 average shifts per man for the year.

The 10 metal-mining States with the largest number of man-hours of exposure in 1932 were Michigan (11,707,925), California (10,051,955), Minnesota (6,258,736), Arizona (6,181,834), Utah (6,147,450), Alaska (5,993,753), Idaho (4,989,429), Montana (4,577,740), South Dakota (3,829,054), and Colorado (3,822,568). Of these, South Dakota with no person killed had the best fatality record per million man-hours of exposure, Minnesota ranked second with a fatality rate per million man-hours of 0.32, Michigan third with a rate of 0.43, and Alaska fourth with a rate of 0.83, while Colorado had the highest or worst rate (2.88), California second highest (2.49), Idaho third (1.80), and Montana fourth (1.75).

In nonfatal accidents per million man-hours of exposure the 1932 rate of 54.48 for all metal mines was somewhat lower or better than the rate of 55.76 for 1931. Oklahoma in 1932 had the highest or worst metal-mining nonfatal-injury rate per million man-hours (127.37), then Colorado (109.87), Utah (94.84), and California (92.42). Minnesota's metal mines had the lowest or best 1932 nonfatal injury rate per million man-hours (14.06), then Alabama (23.92), Georgia (24.75), Tennessee (27.26), New York (27.75), and Michigan (27.93).

In the combined fatal- and nonfatal-injury rate per million man-hours of exposure Minnesota easily had the lowest or best rate of 14.33, Alabama the second lowest (24.59), Georgia third (24.75), Tennessee fourth (28.29), Michigan fifth (28.36), and New York sixth (29.14). In the combined fatal and nonfatal rate, Oklahoma had the highest or worst rate (128.90), Colorado the second highest (112.75), Utah third (96.30), and California fourth (94.91).

Metal mining had a slightly lower combined fatal- and nonfatal-injury rate per million man-hours in 1932 than in 1931, the combined rate being 55.64 in 1932 and 56.77 in 1931. With 107 fatalities and 5,014 nonfatal accidents in metal mines in 1932, the ratio of occurrence of nonfatal to fatal accidents was about 49 to 1; this ratio was about 55 to 1 in 1931.

Table 6, compiled by W. W. Adams, L. E. Geyer, and M. E. Kolnos of the Demographical Division of the Bureau of Mines, gives some data as to accident occurrence and rates in metal and nonmetallic mineral mines in 1932.

TABLE 6. - Accident rates and man-hours of exposure
in metal and nonmetallic mineral mines in 1932

Kind of mine	Men em- ployed	Man-hours worked	Average shifts per man	Average hours per man	Killed	In- jured	Rate per million man-hours		
							Killed	In- jured	Fatal and non- fatal
Copper	9,555	18,608,421	240	1,948	23	859	1.24	46.16	47.40
Gold, silver, and miscel- laneous metal	21,094	40,165,270	237	1,904	61	2,988	1.52	74.39	75.91
Iron	11,954	15,908,514	148	1,331	7	264	.44	16.59	17.03
Lead and zinc (Mississippi Valley) 1/.	3,999	5,531,228	171	1,383	9	375	1.63	67.80	69.43
Nonmetallic mineral	6,686	11,824,893	201	1,769	7	528	.59	44.65	45.24
Total ..	53,288	92,038,326	208	1,727	107	5,014	1.16	54.48	55.64

1/ Includes fluorspar mines in Illinois and Kentucky.

Table 6 indicates that gold, silver, and miscellaneous metal mining had nearly 44 percent of the man-hours worked in metal and nonmetallic mineral mining in the United States in 1932, about 57 percent of the fatalities, and the highest combined fatal- and nonfatal-injury rate per million man-hours (75.91), the average for the entire metal-mining industry being 55.64; lead and zinc mining in the Mississippi Valley had the next highest combined fatal- and nonfatal-injury rate (69.43), and copper mining was third, with a combined rate of 47.40. Iron-ore mining, with a combined rate of 17.03 and with only 7 fatalities and 264 nonfatal accidents to its 11,954 employees, had by far the best or lowest combined fatal and nonfatal injury rate per million man-hours. The combined fatal and nonfatal rate for nonmetallic mineral was 45.24, or considerably below the rate for the metal and nonmetallic mineral mining industries as a whole.

Evidently the gold, silver, copper, lead, and zinc producers have not as yet learned how to mine as safely as the producers of iron ore, and this appears to be true whether the mining is by open-pit or by underground methods, as is shown rather clearly in tables 7 and 8 (compiled by W. W. Adams, L. E. Geyer, and M. E. Kolhos of the Demographical Division of the Bureau of Mines).

TABLE 7. - Accident rates and man-hours of exposure underground in 1932

Kind of mine	Men employed	Man-hours worked	Average shifts per man	Average hours per man	Killed	Injured	Rate per million man-hours		
							Killed	Injured	Fatal and non-fatal
Copper	5,441	10,153,047	234	1,866	21	700	2.07	68.24	71.01
Gold, silver, and miscellaneous metal	13,494	26,396,453	244	1,956	52	2,464	1.97	93.35	95.32
Iron	6,975	8,242,252	141	1,132	5	204	.61	24.75	25.36
Lead and zinc (Mississippi Valley) 1/ ..	3,420	4,750,658	172	1,733	8	342	1.68	71.99	73.67
Nonmetallic mineral	1,991	2,932,961	179	1,473	2	210	.68	71.60	72.28
Total ..	31,321	52,475,371	207	1,675	88	3,920	1.58	74.70	76.38

1/ Includes fluorspar mines in Illinois and Kentucky.

TABLE 8. - Accident rates and man-hours of exposure in open-cut mines in 1932

Kind of mine	Men employed	Man-hours worked	Average shifts per man	Average hours per man	Killed	Injured	Rate per million man-hours		
							Killed	Injured	Fatal and non-fatal
Copper	1,171	2,072,976	221	1,770	1	52	0.48	25.08	25.56
Gold, silver, and miscellaneous metal	513	377,655	132	1,207	---	18	---	47.66	47.66
Iron	1,607	2,729,634	175	1,699	1	30	.37	10.99	11.36
Lead and zinc (Mississippi Valley) 1/ ..	76	54,640	30	719	---	1	---	18.30	18.30
Nonmetallic mineral	2,158	3,276,114	160	1,518	---	146	---	44.56	44.56
Total ..	5,325	8,511,019	175	1,598	2	247	.23	29.02	29.25

1/ Includes fluorspar mines in Illinois and Kentucky.

In 1911, the first year of active work of the United States Bureau of Mines, the number of persons killed per thousand 300-day workers in and around the mines of the United States (other than coal mines) was 4.45; in 1932 this figure was reduced to 2.89 (it was only 2.53 in 1931). If the 1911 rate of 4.45 had continued through January 1, 1931 there would have been 12,035 persons killed in metal mining in the United States (all mines other than coal mines) instead of the 9,645 that were killed. If the 1911 fatality rate of 4.45 had been in effect in 1931 there would have been 378 killed in our metal mines instead of 158, and if the 4.45 rate had been in effect in 1932 there would have been 165 metal-mine fatalities in the United States instead of 107. The fatality rate per thousand 300-day workers in our mines (other than coal mines) has been falling steadily though not very rapidly. For the 5-year period 1911-15, inclusive, the rate was 4.01; for the 5-year period 1916-20, inclusive, it was 3.70; for the 5-year period 1921-25, inclusive, it was 3.23; and for the period 1926-30, inclusive, it was 3.02. For 1930 it was 2.92, for 1931 it was 2.53, and for 1932 it was 2.89; 1933 had the lowest rate (2.50).

Our noncoal mines have also made slow but steady improvement in nonfatal injuries. The nonfatal injury rate per thousand 300-day workers was 198.57 for the 5-year period 1911-15, inclusive; it was 241.34 for the 5 years 1916-20, inclusive, 273.04 for the 5 years 1921-25, inclusive, 310.20 for the period 1926-30, inclusive, 139.56 in 1931, and 135.57 in 1932. The rate for 1932 (135.57) is by far the lowest since data have been assembled by the Bureau of Mines, the rate for the 20-year period 1911-30, inclusive, being 228.79.

The progress of the metal-mining industry in safety during the last 5-year period for which definite figures are available (1928-32, inclusive) is shown by the rates for these years on occurrence of all kinds of accidents (fatal plus nonfatal) per thousand 300-day workers. In 1928 the rate was 208.11, in 1929 it was 203.14, in 1930 it had fallen to 170.78, in 1931 to 142.03, and in 1932 to the all-time low of 138.47.

In 1911 there were 26,577 nonfatal accidents in our metal mines, while in 1932 there were 5,014; in 1911 there were 695 fatalities in our metal mines and in 1932 only 107; while most of these accident decreases are due to decreases in personnel and in industrial activity, there is no question but that our metal-mining industry is, in large part, becoming "safety minded", although in parts of the industry, generally, the smaller mining operations, progress is so slow as to be almost imperceptible.

QUARRYING

Final Nation-wide data as to accident occurrence in the quarry industry in 1933 will not be available for some months, or until some time in the late fall of 1934. However, the Demographical Division of the Bureau of Mines has assembled some significant figures as to data on accident occurrence in 622 identical quarries in 1932 and 1933. These 622 plants produced 53,117,345 tons of rock in 1933, or somewhat more than the 51,339,952 tons of 1932, and employed more men (32,705) in 1933 than in 1932 (30,443); 47,577,268 man-hours were worked in 1933 as against 51,684,848 in 1932, a rather marked decrease in

working time considering the increased production. Twenty-two persons were killed and 1,754 injured nonfatally in 1933 compared with 17 killed and 1,830 injured in 1932. The fatality rate per million man-hours of exposure was 0.46 in 1933, or considerably higher than the rate of 0.33 in 1932; the nonfatal rate was 36.93 in 1933 against 35.41 in 1932. The rate of fatal plus nonfatal accidents per million man-hours was 37.39 in 1933 and only 35.74 in 1932, hence if the 1933 accident experience of these 622 quarries employing about half of the quarry workers of the United States is indicative of the experience of the industry as a whole, the quarry industry will have deteriorated to some extent in its safety record for 1933.

Table 9, compiled by W. W. Adams and L. E. Geyer of the Demographical Division of the Bureau of Mines, gives the latest available data by States on accident occurrence in the quarries of the United States in 1932.

This table indicates that 56,866 persons were engaged in quarry work in the United States in 1932, or more than the number engaged in metal and non-metallic mineral mining, as there were only 53,288 persons so employed in 1932 insofar as available data indicate. The States with the greatest number employed in quarrying in 1932 were Pennsylvania (9,293), Ohio (4,036), California (3,411), New York (3,264), Vermont (2,823), Illinois (2,816), and Indiana (2,720). Of the 42 States listed in the table, 25 had no fatal accidents in quarries in 1932. South Carolina had the highest fatality rate per million man-hours (22.72), Oregon the next highest (5.18), then Kansas (2.62), and then New Hampshire (1.49). Of the States with the largest employment and man-hours of exposure, New York with 5,623,416 man-hours and no fatalities had the best record on a fatality basis, Vermont with 5,615,834 man-hours and no fatalities was not far behind, and California with 5,077,454 man-hours and 1 fatality had a fatality rate of only 0.20 per million man-hours.

Florida with a fatal plus nonfatal rate of only 6.87 per million man-hours of exposure had the lowest or best combined rate, and since no fatality entered into this the rate was an excellent one. Nebraska had a combined rate of 7.95, and this also was without a fatality. Arkansas with a combined rate of 16.22 (also without a fatality) was third lowest. Of the States with the larger number of employees and man-hours of exposure, Illinois had the best combined fatal plus nonfatal rate (20.87), New York next best (27.03), Pennsylvania third (31.10), and Vermont fourth (35.79). The combined rate for the entire industry in 1932 was 32.48, hence Illinois, New York, Pennsylvania, and Vermont, all with man-hours of exposure in excess of 4,500,000 in 1932, had combined fatal and nonfatal rates lower than the average rate in the Nation as a whole.

That quarrying is partaking of the recent progress in safety of other branches of the mining and allied industries may be seen from the fact that for the 10-year period 1921 to 1930, inclusive, the quarrying industry of the United States had a combined fatal plus nonfatal injury rate of 157.79 per thousand 300-day workers, while the rate for 1931 was only 106.04 and that for 1932 only 97.33. The 1932 quarry fatality rate of 0.86 per thousand 300-day workers is by all odds the lowest of any year in the annals of the industry.

TABLE 9.-- Accident rates and man-hours of exposure in the quarrying industry 1/
in the United States in 1932

State	Men em- ployed	Man-hours worked	Average shifts per man	Average hours per man	Killed	In- jured	Rate per million man-hours		
							Killed	In- jured	Fatal and non- fatal
Alabama	1,591	2,380,264	163	1,496	-	172	-	72.26	72.26
Arizona	84	122,640	183	1,460	-	7	-	57.06	57.06
Arkansas	131	184,930	185	1,412	-	3	-	16.22	16.22
California ...	3,411	5,077,454	210	1,489	1	297	0.20	58.49	58.69
Colorado	301	285,858	123	950	-	12	-	41.98	41.98
Connecticut ..	376	568,900	183	1,513	-	21	-	36.91	36.91
Florida	216	436,991	227	2,023	-	3	-	6.87	6.87
Georgia	2,045	3,431,266	194	1,678	1	108	.29	31.48	31.77
Idaho	51	69,725	170	1,367	-	4	-	57.37	57.37
Illinois	2,816	4,647,416	231	1,650	2	95	.43	20.44	20.87
Indiana	2,720	4,216,491	182	1,550	1	179	.24	42.45	42.69
Iowa	1,115	2,368,170	207	2,124	-	65	-	27.45	27.45
Kansas	812	1,143,397	164	1,408	3	47	2.62	41.11	43.73
Kentucky	1,093	1,841,977	187	1,685	-	78	-	42.35	42.35
Maine	1,039	1,283,026	152	1,235	1	66	.78	51.44	52.22
Maryland	792	1,485,355	212	1,877	1	44	.67	29.60	30.27
Massachusetts.	2,008	3,610,277	216	1,798	1	196	.28	54.29	54.57
Michigan	1,777	2,725,512	177	1,534	-	58	-	21.28	21.28
Minnesota	1,010	1,632,712	202	1,617	-	123	-	75.33	75.33
Missouri	2,315	4,596,088	234	1,985	1	215	.22	46.78	47.00
Montana	148	247,934	209	1,675	-	9	-	36.30	36.30
Nebraska	268	629,233	283	2,348	-	5	-	7.95	7.95
New Hampshire.	505	670,008	166	1,327	1	26	1.49	58.01	40.30
New Jersey ...	1,397	1,925,914	157	1,379	1	67	.52	34.79	35.31
New York	3,264	5,623,416	197	1,723	-	152	-	27.03	27.03
North Carolina	463	743,649	193	1,606	-	45	-	60.51	60.51
Ohio	4,036	6,803,346	195	1,686	2	226	.29	33.22	33.51
Oklahoma	557	802,096	175	1,440	-	24	-	29.92	29.92
Oregon	180	192,835	135	1,072	1	10	5.18	51.84	57.02
Pennsylvania .	9,293	14,650,919	131	1,578	10	446	.68	30.42	31.10
Rhode Island .	120	163,253	172	1,402	-	3	-	17.83	17.83
South Carolina	45	44,010	159	978	1	4	22.72	90.89	113.61
South Dakota .	214	260,707	145	1,218	-	23	-	88.22	88.22
Tennessee	1,762	3,237,903	205	1,838	1	164	.31	50.65	50.96
Texas	1,300	2,592,424	222	1,994	1	72	.39	30.47	30.86
Utah	217	288,116	166	1,328	-	18	-	62.47	62.47
Vermont	2,823	5,615,834	246	1,989	-	201	-	35.79	35.79
Virginia	1,579	3,162,082	220	2,003	2	79	.63	24.98	25.61
Washington ...	667	826,617	154	1,239	-	53	-	64.12	64.12
West Virginia.	1,007	1,238,212	162	1,230	-	25	-	20.19	20.19
Wisconsin	881	1,150,286	152	1,306	-	96	-	83.46	83.46
Wyoming	93	147,718	197	1,588	-	9	-	60.93	60.93
Not segre- gated 2/	344	569,849	181	1,657	-	17	-	23.83	23.83
Total ...	56,866	93,709,860	195	1,648	32	3,574	.34	38.14	38.42

1/ The figures cover quarrying, stone-crushing, rock-dressing, and the manufacture of cement and lime.

2/ Includes Louisiana, Nevada, and New Mexico.

PETROLEUM

The United States Bureau of Mines does not assemble Nation-wide accident statistics on the petroleum industry; the Department of Accident Prevention of the American Petroleum Institute in April 1934 issued its "Annual Summary of Injuries in the Petroleum Industry for 1933", and from this publication the following data were obtained.

The report for 1933 covers 232,862 workers, the accident frequency being 13.00 and the accident severity 1.90; similar figures for 1932 were 226,304 workers with an accident frequency of 12.28 and an accident severity of 1.91. It therefore appears that compared with 1932 there was an increase of 5.9 percent in accident frequency and a decrease of about 0.5 percent in accident severity.

That the petroleum industry has participated in the downward trend in accident occurrence in mining during the past few years is seen from the fact that accident frequency in the industry was 31.15 in 1927, 27.33 in 1928, 26.78 in 1929, 18.05 in 1930, 14.14 in 1931, 12.28 in 1932, and 13.00 in 1933; accident severity was 2.65 in 1927, 2.69 in 1928, 2.49 in 1929, 2.37 in 1930, 2.06 in 1931, 1.91 in 1932 and 1.90 in 1933.

The report of the American Petroleum Institute says:

By applying the frequency rate of 1927 (31.15 injuries to each 1,000,000 hours worked) to the hours reported by companies each year since 1927, a reduction of 41,910 injury cases is reflected. Had these 41,910 injuries occurred, each would have cost the companies approximately \$300.00 in medical and compensation claims, or a total of \$12,573,000. However, the real satisfaction that the industry has is the knowledge that it has reduced anguish, suffering, and financial loss to its employees and has reduced the charitable burden of the Nation by a reduction in the number of industrial cripples.

CONCLUSION

The number of fatalities and the fatality rate per million tons of coal produced have fallen steadily (though with a few "peaks" in isolated years). The significance as well as the magnitude of this decrease in the coal-mining fatality rate is apparent when it is known that if the 5.89 fatality rate for the 5-year period 1906-10 had continued to the first of January 1934 the number of fatalities in the coal mines of the United States would have been 24,300 greater than they actually were; hence, during the 23 years that the Bureau of Mines has existed, the fatality rate has been reduced sufficiently to indicate an average annual saving of life of more than 1,000 persons; similar figures as to prevention of nonfatal accidents are not available, but it is estimated that about 50 nonfatal accidents occur to 1 fatality, hence it is probable that about 50,000 nonfatal accidents annually have also been eliminated. If the cost to the operator of a life is put into cold-blooded

dollars and cents and a relatively low amount such as \$5,000 is taken as the "value" of a life, it will readily be seen that, irrespective of ethical or humanitarian considerations and not considering nonfatal accidents, the annual saving of somewhat more than 1,000 lives may be considered as "worth" more than \$5,000,000 to the mine operators, or almost five times the total amount being expended by the Bureau of Mines during the present fiscal year and nearly double the entire expenditure of the Bureau for any year of its existence. If it is also conceded that as many as 50,000 nonfatal accidents per year have been prevented (and the assumption is by no means a wild one) and the "cost" to the operator in compensation, hospitalization, etc., of a nonfatal accident is placed at \$100.00, it will be seen that at least an additional \$5,000,000 has been saved to the coal industry through the safer operation of the past 23 years.

The benefits to the workers in and around coal mines due to this increased safety of operation are much more impressive than are those to the mine operator. The prevention of the death of 24,300 coal-mine workers in the past 23 years has obviously prevented a vast amount of suffering, pain, and misery of various kinds to the families who would have been bereft of their loved ones. Moreover, the prevention of 50,000 or more nonfatal accidents annually for 23 years certainly has saved the miners, their families, their friends, and the community a large amount of pain, inconvenience, misery, and similar losses.

The financial losses the workers have avoided through increased safety in coal-mine operation are in themselves colossal. The average age of the coal-mine worker who is killed is about 35 years, and under normal conditions he should have a future active working period of at least 20 years. In normal times he should earn at least \$1,000 annually, hence in his 20 years of active life expectancy he would receive approximately \$20,000 for his services. Hence the saving of the life of about 24,300 coal-mine workers in the past 23 years through decreased death rate in coal mining has prevented a financial loss to them of at least \$486,000,000, and this does not consider the financial losses saved to the worker through elimination of large numbers of nonfatal accidents. Thus, for the past 23 years an annual saving of upward of \$21,000,000 has been made to coal-mine workers in the prevention of fatalities; \$21,000,000 is far more than the total expenditures on safety work by the Bureau of Mines since its establishment in 1910, therefore the coal-mine worker unquestionably is reaping annual dividends of several hundred (probably several thousand) percent on the expenditures of the Federal Government in the promotion of safety in coal mining. The workers in other parts of the mining and allied industries are reaping similar benefits but possibly on a somewhat reduced scale.

While unquestionably progress has been made towards the safe operation of mines, much if not most of it in the past 5 years, it would be a terrible mistake to assume that the ultimate in safe operation of mines has been reached, as this is anything but the truth. The latest available statistics indicate that mining still has the highest or worst accident rate of the major industries of the United States and that the industrial accident rate of the United States is the highest or worst of the countries in the world with the exception of Chile. While progress has been made and is being made towards safer operation of our mines, the work has only begun, and the end should not be at hand until

accident occurrence in our mines (coal, metal, and nonmetallic) has been reduced at least 75 percent below what it is at present.

Unquestionably many, probably most, oldtimers in mining, including both officials and workers, on reading the above statement will immediately say that it is utterly out of the question to reduce "present-day accident occurrence" in the mining and allied industries by 75 percent. Their conclusion could not have been refuted very successfully as late as 6 or 7 years ago; however, since about 1925 so many instances are available of reductions in accident frequency, accident severity, and accident cost of 90 percent or over, as compared with past records, that placing the figures for possible accident reduction for mining at 75 percent is well within the bounds of conservatism.